A.2
1/15/96

MONTGOMERY WATSON

January 15, 1996

Ms. Sheri Bianchin, RPM
Mail Code (HSR-6J)
U.S. EPA, Region 5
77 West Jackson Blvd.
Chicago, IL 60604-3590

Re: Response to comments
Dewatering/Barrier Wall Work Plan
ACS NPL Site, RD/RA

Dear Ms. Bianchin:

Montgomery Watson has revised the December 15, 1995 draft of the Dewatering/Barrier Wall Alignment Pre-Design Work Plan in response to your comments dated January 11, 1996. The revised document is about 1.5 inches thick and much of it has not been changed. We are sending to you by facsimile, just the sections that have been modified. These include:

- The Work Plan Text, Table, and Figures
- Addendum to Appendix C
- Appendix D
- Addendum to Appendix G

To facilitate your review, we have marked the comment numbers from your letter in the margin next to each change. Bound copies of the complete Work Plan will be sent to you later this week.

We look forward to your approval of this Work Plan. If you have questions, please do not hesitate to call me at (708) 691-5020.

Sincerely,

MONTGOMERY WATSON

Peter J. Vagt
Vice President
Principal Hydrogeologist

cc: Holly Grejda, IDEM
Rob Lantz, B&VWS
Ron Frehner, CRA

PJV
C:\MSOFFICE\WINWORD\JOBS\ACS\TRNSMTL.DOC

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Serving the World's Environmental Needs

MONTGOMERY WATSON

January 12, 1996

Ms. Sheri Bianchin, RPM
Mail Code HSRL-6J
U.S. EPA Region V
77 West Jackson Blvd.
Chicago, Illinois 60604-3590

Re: Dewatering/Barrier Wall Alignment Pre-Design Work Plan
American Chemical Service, Inc. NPL Site
Griffith, Indiana

Dear Ms. Bianchin:

Montgomery Watson Americas, Inc. (Montgomery Watson), on behalf of the ACS RD/RA Executive Committee, has revised this Work Plan to perform borings to confirm the proposed dewatering/barrier wall alignment in response to the comments in your letter dated November 22, 1995 and January 11, 1996. As we discussed at our meeting on July 19 and 20, 1995, the ACS plant personnel need to relocate overhead and underground utilities in the area of the proposed barrier wall on-site. Because of the lead time needed to relocate the utilities, the alignment of the barrier wall must be determined in advance of the construction of the barrier walls. This work is a screening level investigation to further estimate the limits of the waste prior to construction of the walls.

The purpose of the dewatering/barrier wall is to isolate wastes in the Still Bottom Pond (SBP) and off site containment area (OFCA) to prevent migration of contaminant from these areas and to allow treatment. Another purpose is to reduce the amount of groundwater to be pumped to reduce potential impact to the wetlands to the west.

Data to be collected and evaluated during the dewatering/barrier wall alignment investigation are:

- Evaluate the lateral extent of waste materials at the locations where dewatering/barrier walls are proposed;
- Collect both field and laboratory geotechnical data (i.e., standard penetration tests and grain size analysis) to aid in the design of the dewatering/barrier walls;

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- Better define the depth to the top of clay confining layer along the proposed dewatering/barrier wall alignment;

- Collect soil samples for slurry wall mix design (for sections of dewatering/barrier wall that will consist of soil/bentonite or cement/bentonite wall);

- Collect groundwater samples for slurry wall mix compatibility testing (for sections of dewatering/barrier wall that will consist of a soil/bentonite or cement/bentonite wall).

The data gathered during this investigation will be used to prepare intermediate (50%) and final (100%) design reports for the dewatering/barrier wall system. The design will address compatibility of the proposed wall with the plume, keying the wall into the underlying clay, monitoring of the walls performance, the nature of waste penetration into the subsurface, and construction QA/QC.

This Work Plan describes the number and location of borings, drilling procedures, sampling protocols, field testing parameters and procedures, and laboratory parameters and methods to be used to confirm the dewatering/barrier wall location and collect geotechnical data for the dewatering/barrier wall design.

Specific Comment #3

The dewatering/barrier wall needs to be installed before the perimeter groundwater containment system (PGCS) becomes operational to prevent migration of contaminants from the SBP and OFCA to the site boundary. Dewatering of the areas will occur over time. The details of the dewatering will be presented in the design documents for the dewatering/barrier wall and the PGCS. The 50% design of the dewatering/barrier wall will include a location map indicating the placement of wells, areas of excavation, discharge area and methods for eliminating overland flow.

The 100% design for the dewatering/barrier wall will include a discussion of the effects of the walls on groundwater flow pattern. It will include recommendations for proposed monitoring wells for monitoring at the downgradient facility boundary. The monitoring will include both water levels to document direction of flow and chemical analysis.

As discussed previously, one purpose of the dewatering/barrier walls is to reduce potential impacts to the wetlands. This is accomplished in two ways. First, because the areas to be dewatered will be surrounded by the walls, there will not be a large groundwater downgrade outside the walls which could have the detrimental effect of dewatering the wetlands. Second, the walls will minimize the amount of water to be pumped for dewatering so that the smallest amount of treated water will flow to the wetlands. This is important because it will minimize the potential of impacting the wetlands by changing the wetland water chemistry.

SCOPE OF WORK

Soil borings, test pits and auger probes conducted during the Remedial Investigation (RI) and subsequent phases of investigation (i.e., Supplemental Soil Sampling Program - 1993) have been used to identify the lateral extent of waste materials at the ACS NPL Site. It is noted that the Supplemental Soil Sampling Program was not conducted with formal approval or oversight of U.S. EPA or IDEM. However, all of the data was supplied to U.S. EPA, IDEM and Roy F. Weston, Inc. (U.S. EPA oversight contractor). Roy F. Weston, Inc. reviewed the data and utilized it in its evaluation of the extent of waste at the site. In addition, the data is only being used to guide the locations of the proposed drilling program. The data are not being used to draw any conclusions regarding the extent of waste at the site. Soils with total VOC concentrations of 1 percent (10,000 parts per million [ppm]) or greater, lead of 500 ppm or greater, and/or total PCB concentrations of 10 ppm or greater are classified as waste in the U.S. EPA Record of Decision (ROD). Previous exploration points in the Still Bottoms/Treatment Lagoon Area are shown on Figure 1 and those in the Off-Site Area are shown on Figure 2. Logs for each exploration point are included as Attachment A. The proposed dewatering/barrier wall alignment, based on these data and aerial photos, for the Still Bottoms/Treatment Lagoon Area is shown on Figure 3, and for the Off Site Area on Figure 4. The alignment on Figure 4 was revised from the May 10, 1995 Work Plan to extend further west. The revised location of the wall was presented at a June 14, 1995 meeting. The location was moved to the west because:

- High concentrations of contaminants are migrating to the west of the OFCA. By relocating the wall to the west, the highest concentrations are contained.

- At certain times, leachate has been observed west of the OFCA. Moving the wall to the west and raising the ground surface west of the OFCA will prevent future leachate seepage.

- Most of the land in the vicinity of the OFCA has been landfilled in the past. It is not appropriate to excavate a slurry wall in a landfill because landfills contain large void spaces and the slurry can float into the refuse. Therefore, the wall alignment was relocated so that there is the greatest potential of encountering natural soils so that the wall can be constructed. It is noted that the soil determined to be waste after the construction of the wall will be treated in accordance with the SOW.

Field investigations within each area will consist of drilling soil borings along the proposed alignment of the barrier walls, and assessing both visually and through field and laboratory analysis the presence of waste materials. If waste materials are found along the proposed alignment, additional borings will be conducted outward from the waste area using borings extending to the clay layer to determine the extent of the waste materials. Soil samples will be collected for field analysis of VOCs and PCBs. Lead will not be analyzed for because previous testing has shown lead to be limited to discrete areas away from the barrier wall location. Field analysis will consist of utilizing a field test kit for analysis of

PCBs, utilizing a field gas chromatograph (GC) for analysis of total VOCs (defined as the sum total of the concentrations of detected target VOCs), and using a hydrophobic dye to test for the presence of free-phase materials. Duplicate soil samples will be submitted for laboratory analysis when results of field analysis show VOCs greater than 8,000 ppm or PCBs close to 10 ppm. Lead will not be analyzed for because previous testing has shown lead to be limited to discrete areas away from barrier wall location, not present here. Based on the previous data, lead contaminated soils will be contained within the walls. Since the work described by the Work Plan is "screening level" and not quantitative, the data derived from the investigation will not be conclusive as to whether or not waste is present.

Drilling Procedures

Potential drilling locations will be marked in the field with wooden stakes prior to beginning field activities at locations agreed to with the U.S. EPA and IDEM onsite representatives. A meeting will be held with representatives of ACS to confirm that the drilling locations will not interfere with plant operations and will not impact either overhead or underground utilities. If proposed locations do interfere, they will be relocated to the closest accessible location.

Soil borings will be drilled using an all-terrain vehicle (ATV) mounted drill rig. It is anticipated an ATV drill rig will be required to access many of the proposed soil boring locations in the Off-Site Containment Area. Soil borings will be drilled with 3.25-inch inside diameter (I.D.) Hollow Stem Augers (HSA) (or equivalent), and soil samples will be collected at 2.5-foot intervals using 2-inch outside diameter split spoons. During collection of split spoon samples, standard penetration data (i.e., blow counts) will be collected for each sampling interval. Samples will be field classified and recorded on field logs. Soil samples will be field screened using a photoionization detector (PID) equipped with an 11.7 eV lamp. Montgomery Watson Standard Operating Procedures (SOPs) for drilling and split spoon sampling of soils are presented as Appendix B. Soil samples will not be composited.

A soil sample will be collected at the interface of the confining clay layer and tested in the field using a hydrophobic dye technique. The hydrophobic dye test consists of placing soil in a 40-ml vial to 1/4 full, adding water to bring the vial to 1/2 full, adding a small amount of dye powder, and then agitating the sample for approximately 30 seconds. The dye, a red color, turns a dark red with the presence of hydrophobic materials (i.e. free phase material). The field screening method will provide an additional indication of the presence of free phase materials. At two locations along each alignment, a 30-inch shelby tube will be pushed into the clay confining layer for the collection of undisturbed soil samples for permeability testing (ASTM D5084). The ASTM Standard is included in Appendix E.

Soil borings will be advanced to a depth of two feet into the confining clay layer. It is anticipated that the clay will be encountered at depths of between 15 and 35 feet below ground surface (bgs) depending upon the investigation area. Following completion of each borehole, borings will be backfilled to the ground surface using a bentonite-cement grout.

To minimize the potential for bridging of annular seal material, grout will be installed from the base of the borehole to the ground surface by pumping via a tremie pipe. In traffic areas within the plant, the top 12 inches of the boring will be backfilled with gravel. Soil boring locations and elevations will be surveyed. Soil cuttings generated during drilling will be contained in Department of Transportation (DOT) approved 55-gallon steel drums, and stored on-site in the designated area for ultimate proper disposal.

Field Analysis Procedures

The soil sample collection procedure is described above. Field analysis for PCBs will be conducted using the Ohmicron Environmental Diagnostics PCB Rapid Assay Soil Test Method. The Ohmicron Test Method conforms to SW-846 Method 4020 for the screening of PCBs using immunoassay methodology. The method has been validated by the U.S. EPA, but is not yet approved. The manufacturer's instructions included with each test kit will be followed (Appendix C) and Field Validation will be conducted throughout the Barrier Wall Investigation sampling, following the Guidance in the *"Immunoassay Methods for SW-846: Recommended Format and Documentation for New Submittals"* (July 1995). Following the Field Validation guidance, known standards will be included in each of the analysis runs.

Ohmicron Specific Comment A

For the ACS site, the sampling will be set up to detect PCBs greater than 10 ppm. (i.e., the detection limit will be established to be 10 ppm). Duplicate analyses and blank analyses will be performed for each set of ten samples. The field laboratory technician will be trained by the Ohmicron staff prior to conducting the procedure in the field. Prior to starting the field work, a performance evaluation sample with a known concentration will be analyzed.

Field analysis for VOCs will be conducted using a field gas chromatograph (GC) equipped with Hall and PID detectors. The SOP, which is attached as Appendix D, is based on SW-846 Method 8010/8070 with modifications. The analyses will include 19 compounds which include all volatiles detected during the RI investigations at concentrations exceeding 100,000 ug/kg or 1% of the ROD definition of soils classified as waste (i.e., soils with total VOC concentrations of 10,000 ppm). Therefore, field GC analyses will provide data of sufficient quality for the specific task.

Number of Samples

One to two soil samples will be collected from each boring drilled along the dewatering/barrier wall alignment for field analysis of VOCs and PCBs (Table 1). Soil samples will be chosen for field analysis based on field PID readings, results of the hydrophobic dye testing, and visual observations. Confirmatory laboratory analyses will be conducted on selected soil samples based on results of field GC analysis for VOCs, and PCB test results.

Laboratory analyses for PCBs and VOCs will be performed on samples from the borings that are located along the "final" alignment, based upon the field testing results (Table 1).

Soil samples that exceed 10 ppm PCBs based on field screening will be submitted for laboratory analysis to determine if the PCBs are actually present. If field GC screening shows VOCs are present at a concentration greater than 8,000 ppm, a sample will be submitted to the laboratory to quantitatively determine the total VOC concentration because the field GC may not detect all VOCs present. Laboratory analyses will be performed in accordance with the Contact Laboratory Program (CLP) Statement of Work by IEA Analytical Laboratory, North Carolina. Laboratory analyses will be performed at Data Quality Objective (DQO) Level 3.

Two soil samples will be collected from borings located at intervals of 200 ft in the Still Bottoms Area and Off-Site Containment Area along the barrier wall alignment for geotechnical analysis. Grain size analysis (ASTM D422) will be conducted on each of the geotechnical samples collected. The ASTM Standard is included in Appendix F. The number of samples, parameters, and analysis methods are provided in Table 1. Geotechnical analyses will be performed at Montgomery Watson's laboratory in Madison, Wisconsin.

Five soil samples selected from the stratigraphic soil samples (i.e., split spoon soil samples collected for soil classification) will be used to conduct slurry wall clay mix design analysis. The soil samples will be mixed in the laboratory and the resulting slurry will be subjected to permeability testing using flexible-wall permeameters based on ASTM D5084 "Standard Test Method," for measurement of hydraulic conductivity of saturated, porous material (Table 1). The samples will be selected to provide a range of the various soil types that are encountered during the drilling program. Five samples were selected because previous soil borings show that the subsurface sands are relatively uniform across the site, but did vary in grain size at different locations.

A groundwater sample will be collected from well MW-16, representative of impacted groundwater, and will be used as the permeant fluid for conducting compatibility testing on the optimum slurry mix. Samples from MW-16 are expected to be a "worst case" sample of groundwater expected to be in contact with the slurry wall. The test procedure will be based on ASTM D5084 and U.S. EPA SW-846 Method 9100 "Saturated Hydraulic Conductivity Saturated Leachate Conductivity, and Intrinsic Permeability" (Table 1). The procedure for Method 9100 is included in Appendix G.

Boring Locations - Still Bottoms/Treatment Lagoon Area

Thirty soil borings at approximately 25- to 50-foot intervals will be drilled in the vicinity of the Still Bottoms/Treatment Lagoon Area as shown on Figure 3. The borings will be generally drilled on 50-foot intervals because the dewatering/barrier wall alignment needs to be well defined in this area because of potential impacts to ACS operations. Along the railroad tracks on the west side of this area the interval is reduced to 25 feet. The depth to clay is estimated to be approximately 21 to 25 feet in the Still Bottoms/Treatment Lagoon Area, and each boring will be drilled two feet into the clay confining layer to confirm the depth to clay. The estimated depth to clay is based on the clay contour map prepared as part of the RI.

The current estimate of waste extent does not indicate that waste extends beneath the railroad spur located along southwest side of the proposed barrier wall. The borings will be located to confirm that waste does not extend adjacent to and/or beneath the railroad tracks in this area. The information will be used to evaluate whether the presence of the rail spur needs to be incorporated into the dewatering/barrier wall design and construction plans. Total PCB concentrations greater than 10 ppm were noted in soil samples collected from soil borings SB92 and SB93 (Figure 1) at a depth of 3 ft, and therefore, additional PCB testing will be done in this area.

Northwest of the Fire Pond is an area previously determined to contain PCBs at concentrations greater than 10 ppm, and therefore, PCB testing will be done in this area. PCB concentrations above 10 ppm were noted in soil samples collected from boring SB20 at a depth of 7 feet, and in soil samples collected from borings SB90 and SB91 at depths up to 5 feet (total boring depth 5 ft). The borings will be located to confirm that PCBs do not extend to and beneath the railroad tracks in this area.

North of the Fire Pond the borings are located to evaluate the previous results from soil samples collected from boring SB89. Total PCB concentrations above 10 ppm were noted at a depth of up to 5 feet in boring SB89 (total boring depth 5 ft).

East of the Still Bottoms/Treatment Lagoon Area, extent of PCBs was estimated to extend to beneath the container storage area/loading dock. Soil borings will be located to determine if PCB impacted soil does extend to the container storage area/loading dock. Soil borings will also be drilled along the proposed alignment to confirm the delineation of waste noted from borings SB70, SB71 and SB94. Total PCB concentrations above 10 ppm were noted in soils collected from SB70 and SB71 at a depth of 8 ft. The presence of waste was not indicated in samples collected from SB94, located further southeast of SB70 and SB71.

Boring Locations - Off-Site Area

Twenty-two soil borings will be drilled in the Off-Site Area at 50 to 200 ft intervals along the proposed dewatering/barrier wall alignment as shown on Figure 4. The borings will be drilled on 200-foot intervals because the location of the dewatering/barrier wall in the Off-Site Area is not as sensitive to plant operations as in the On-Site Area. In addition, the proposed alignment is anticipated to be well beyond the limits of waste in this area, so the 200-ft spacing is reasonable. In the area between borings AP-65 and SB-53, the interval has been reduced to 50 feet to investigate PCBs that were detected in these areas. The barrier wall alignment includes the waste areas, as well as the areas with refuse to the east near Colfax Avenue. The proposed alignment extends westward to the site boundary. This was done to prevent the migration of contaminated groundwater in this area. In addition, during rainfall, seeps have been detected in this area, so the wall will prevent migration of this water. The depth to clay is estimated at approximately 28 to 33 ft in borings proposed along the west and south sections of the alignment. The depth to clay is estimated at approximately 15 ft along the north section of the alignment, and at approximately 20 ft in

borings proposed along the west portion of the alignment. Each boring will be drilled to verify the depth to the clay. The estimated depth to clay is based on the clay contour map prepared as part of the RI.

Pilot Test Cell Borings

It was originally intended that the barrier walls and dewatering system would be completely installed and the entire area dewatered prior to conducting the pilot studies. With the current schedule, the installation of the Perimeter Groundwater Containment System and barrier walls will occur in early 1996 with operation to begin in mid-1996. Therefore, it is not possible to dewater the Still Bottoms/Treatment Lagoon Area and the Off-site Area in time to conduct the pilot scale testing scheduled for mid-1996. Therefore, smaller test cells are proposed for the pilot tests. These would consist of sheet pile cells approximately 20 feet by 20 feet in plan dimension, driven to the top of clay. These cells would then be dewatered to facilitate the pilot tests. The locations of the test cells are shown on Figures 3 and 4. The information needed to develop the construction specifications for the sheet pile test cells include standard penetration testing, field soil classification, and the depth to clay. Field and laboratory chemical analyses will not be needed and so will not be performed on soil samples collected from the Pilot Test Cell borings.

Specific comment #2

The soil borings will be performed as described above under "Drilling Procedures", including that the soil borings will be advanced two feet into the clay. Up to six borings will be performed in the Off-Site Containment Area and up to four borings will be performed in the Still Bottoms/Treatment Lagoon Area to gather the information needed to locate the Pilot Test Cells. The boring locations will be agreed to in the field with the U.S. EPA and IDEM on-site representatives.

SCHEDULE AND REPORTS

The field team will mobilize to the site within one week of approval of this work plan since the U.S. EPA has stated that the 14-day notice required by the UAO has been waived. The field work for drilling the borings is anticipated to be complete in two to three weeks. The design of the dewatering activities for the pilot testing of ISVE of waste, the materials handling the pilot test, and the LTTT treatability tests are dependent on the results of this investigation. The pilot test cell-related results will be submitted with the Preliminary (30%) Design for Waste and Soil (currently scheduled to be submitted in January 1997). The barrier wall-related results will be provided in the 50% design report for the barrier wall and dewatering system. The schedule for submittal of the 50% design report has not been completed.

CLOSING REMARKS

If you have any questions, please contact us at (708) 691-5000 for assistance.

Sincerely,

Peter J. Vagt
Vice President
Principal Hydrogeologist

Attachments:

Table 1	Sample Number, Parameters, and Methods
Figure 1	Existing Boring Location Map - Still Bottoms/Treatment Lagoon Area
Figure 2	Existing Boring Location Map Off Site Containment Area
Figure 3	Proposed Boring Location Map - Still Bottoms/Treatment Lagoon Area
Figure 4	Proposed Boring Location Map - Off-Site Containment Area
Appendix A	Soil Boring, Test Pit and Auger Probe Logs
Appendix B	Drilling and Soil Sampling SOP
Appendix C	Ohmicron RaPID Assay Environmental User's Guide (PCB Test Method)
Appendix D	Field Gas Chromatography SOP
Appendix E	ASTM D5084
Appendix F	ASTM D422
Appendix G	Method 9100

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Table 1
Sample Numbers, Parameters, and Methods
Dewatering/Barrier Wall Alignment Work Plan
American Chemical Service, Inc. NPL Site

Investigation Area	Lab[1]	No. of[2] Samples	Field Duplicates	Field Blanks	MS/MSD[3]	Total No. Samples	Parameters[4]	Lab[5] Method
Still Bottoms/Treatment Lagoon Area Investigation	Field	63	6	6	3	75	Target VOCs	SW-846 8010/8020
	Field	63	6	6	–	72	Total PCBs	SW-846 4020
	IEA	15	1	2	1	19	CLP TCL VOCs	CLP SOW - VOCs
	IEA	15	1	2	1	19	CLP TCL PCBs	CLP SOW - PCBs
	MW	12	–	–	–	12	Grain Size (Sieve and Hydrometer) Analysis (one per 200 feet)	ASTM D422
Off-Site Area Investigation	Field	44	4	4	2	54	Target VOCs	SW-846 8010/8020
	Field	44	4	4	–	52	Total PCBs	SW-846 4020
	IEA	11	1	1	1	14	CLP TCL VOCs	CLP SOW - VOCs
	IEA	11	1	1	1	14	CLP TCL PCBs	CLP SOW - PCBs
	MW	32	–	–	–	32	Grain Size (Sieve and Hydrometer) Analysis	ASTM D422
Clay Confining Layer	MW	4	–	–	–	4	Hydraulic Conductivity	ASTM D5084
Slurry Wall	MW	5	–	–	–	5	Hydraulic Conductivity	ASTM D5084
Slurry Wall	MW	1	–	–	–	1	Compatibility Testing	ASTM D5084 SW 846 9100

Notes:

1. Labs are as follows:

IEA Laboratories 3000 Weston Parkway Cary, NC 27513 800-444-9919	Montgomery Watson 1 Science Court Madison, WI 53711 608-231-4747

2. The actual number of samples will be based upon the field testing results.
3. MS/MSD samples will be collected at a ratio of 1 MS/MSD for each 20 investigative samples.
4. For a complete list of field parameters see Appendices C and D of the Dewatering/Barrier Wall Alignment Work Plan.
   Contract laboratory program (CLP) target compound list (TCL) VOCs are presented in exhibit C of the CLP statement of work (SOW) OLM02.1 (or most current).
   Complete data package deliverables are required for CLP TCL VOCs and PCBs.
5. SOPs for target VOC and total PCBs are included in Appendices C and D of the Dewatering/Barrier Wall Alignment Work Plan.
   CLP TCL VOCs and PCBs are to be analyzed using protocols presented in the CLP SOW OLM02.1 (or most current).

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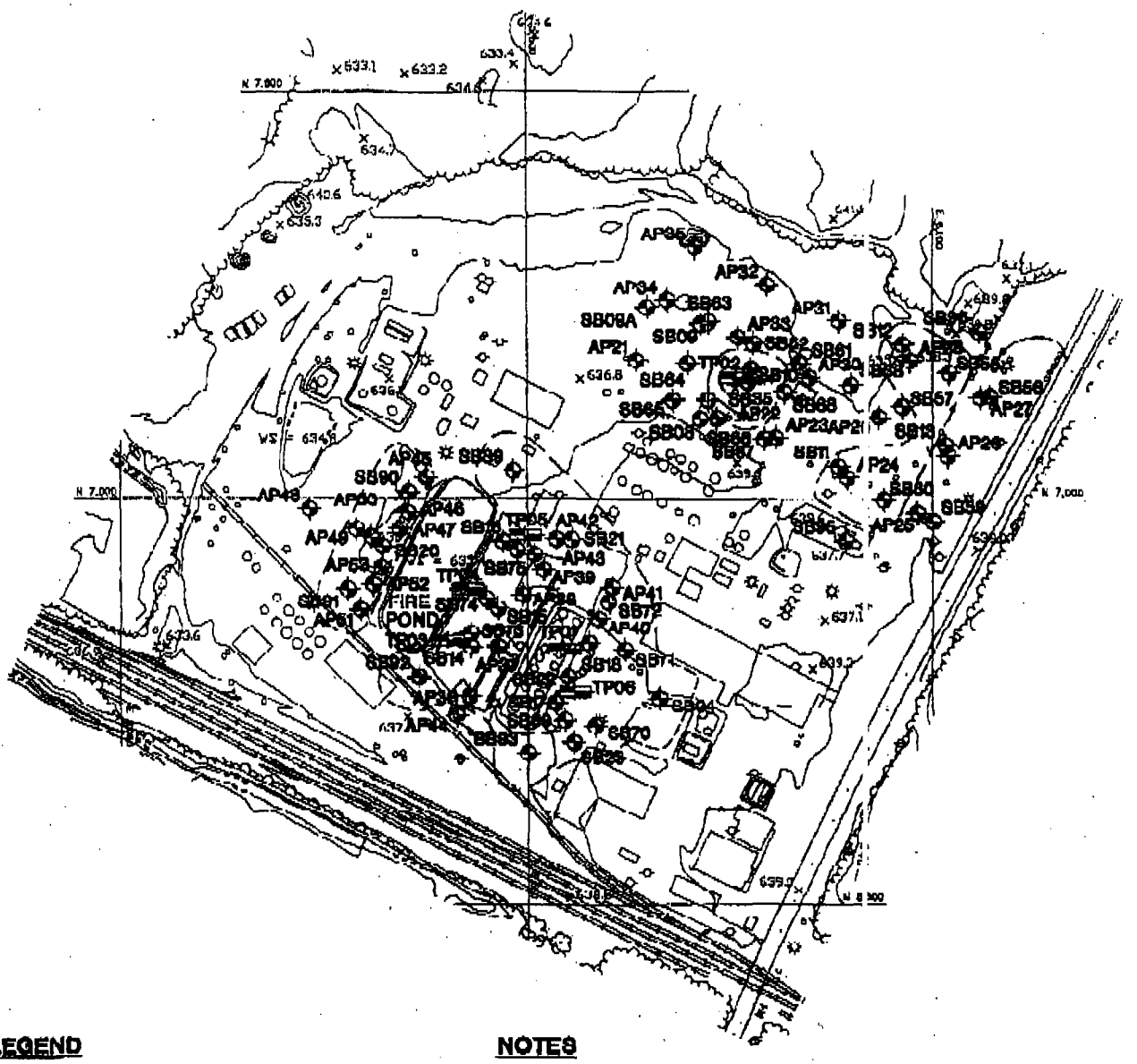

LEGEND

- SB82 — EXISTING SOIL BORING LOCATION AND NUMBER
- AP36 — EXISTING AUGER PROBE LOCATION AND NUMBER
- TP03 — EXISTING TEST PIT LOCATION AND NUMBER
- RAILROAD TRACK
- TOPOGRAPHIC CONTOUR
- APPROXIMATE EXTENT OF KNOWN SOIL CONTAMINATION

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL SURVEY MAP OF THE SITE FLOWN ON MARCH 8, 1994 BY GEONEX CHICAGO AERIAL SURVEY, INC.
2. VERTICAL DATUM IS U.S.G.S. DATUM. CONTOUR INTERVAL IS 2 FEET.

north

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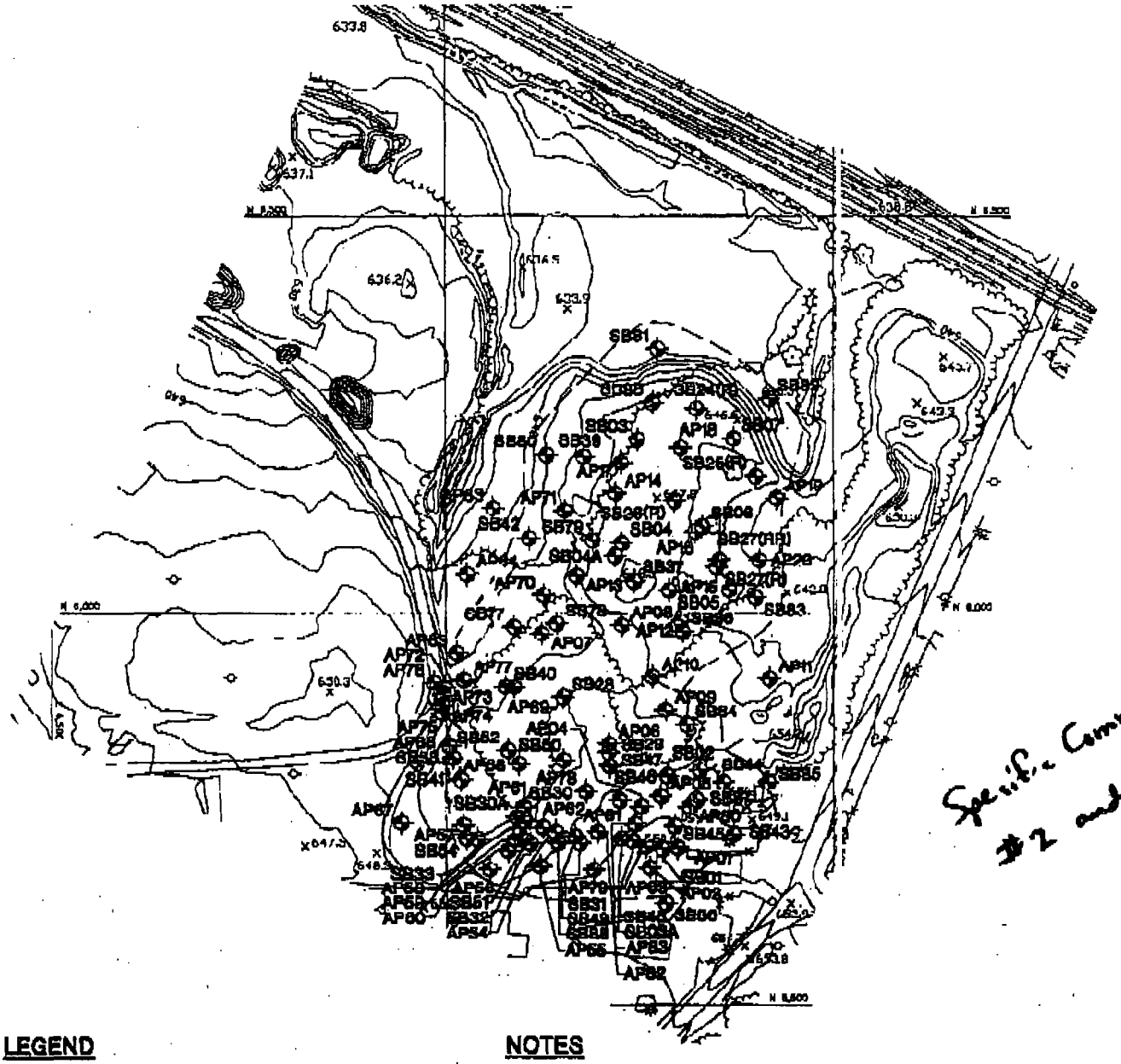
SCALE IN FEET

FIGURE 1

Developed By PMS Drawn By TPB Approved By M. Hampton Date 5-10-95 Reference Revisions	**EXISTING SOIL BORING LOCATION MAP- STILL BOTTOMS/TREATMENT LAGOON AREA** BARRIER WALL ALIGNMENT WORK PLAN AMERICAN CHEMICAL SERVICE, INC. NPL SITE GRIFFITH, INDIANA	Drawing Number 4077.0110 A1 MONTGOMERY WATSON



Specific Comment #2 and #3

LEGEND

- AP67 — EXISTING AUGER PROBE LOCATION AND NUMBER
- SB28 — EXISTING SOIL BORING LOCATION AND NUMBER
- RAILROAD TRACK
- TOPOGRAPHIC CONTOUR
- APPROXIMATE EXTENT OF CONTAMINATED SOIL

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL SURVEY MAP OF THE SITE FLOWN ON MARCH 8, 1994 BY GEONEX CHICAGO AERIAL SURVEY, INC.
2. VERTICAL DATUM IS U.S.G.S. DATUM. CONTOUR INTERVAL IS 2 FEET.

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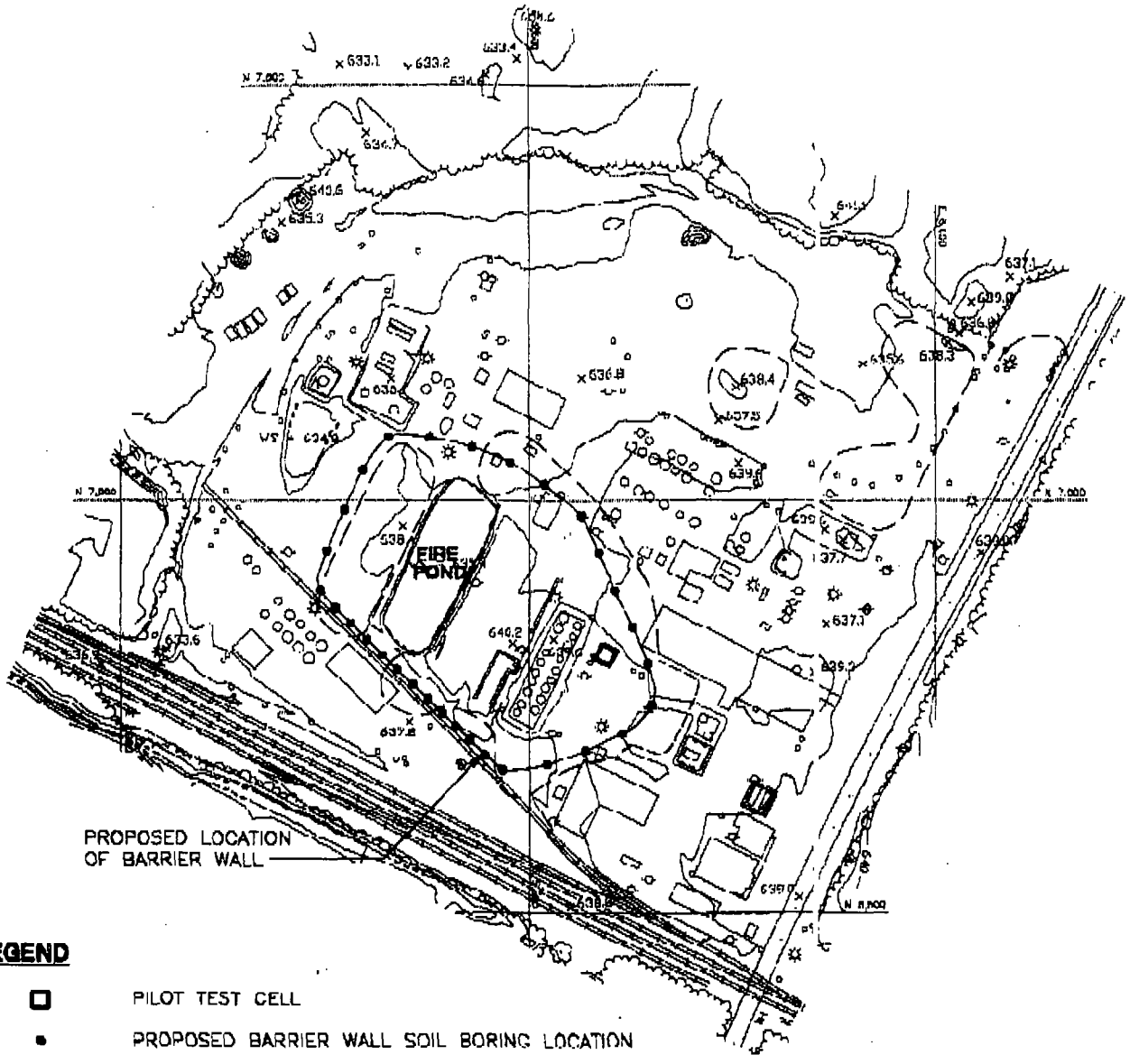
SCALE IN FEET

FIGURE 2

Developed By PMS	Drawn By TPB	EXISTING SOIL BORING LOCATION MAP- OFF-SITE CONTAINMENT AREA	Drawing Number 4077.0110 A2
Approved By H. Hampel	Date 6-10-95	BARRIER WALL ALIGNMENT WORK PLAN AMERICAN CHEMICAL SERVICE, INC. NPL SITE GRIFFITH, INDIANA	MONTGOMERY WATSON
Reference			
Revisions			



LEGEND

- PILOT TEST CELL
- PROPOSED BARRIER WALL SOIL BORING LOCATION
- PROPOSED LOCATION OF BARRIER WALL
- RAILROAD TRACK
- TOPOGRAPHIC CONTOUR
- APPROXIMATE EXTENT OF KNOWN SOIL CONTAMINATION

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL SURVEY MAP OF THE SITE FLOWN ON MARCH 8, 1994 BY GEONEX CHICAGO AERIAL SURVEY, INC.
2. VERTICAL DATUM IS U.S.G.S. DATUM. CONTOUR INTERVAL IS 2 FEET.
3. FINAL BARRIER WALL LOCATION IS DEPENDENT ON RESULTS OF SOIL BORING PROGRAM.

north

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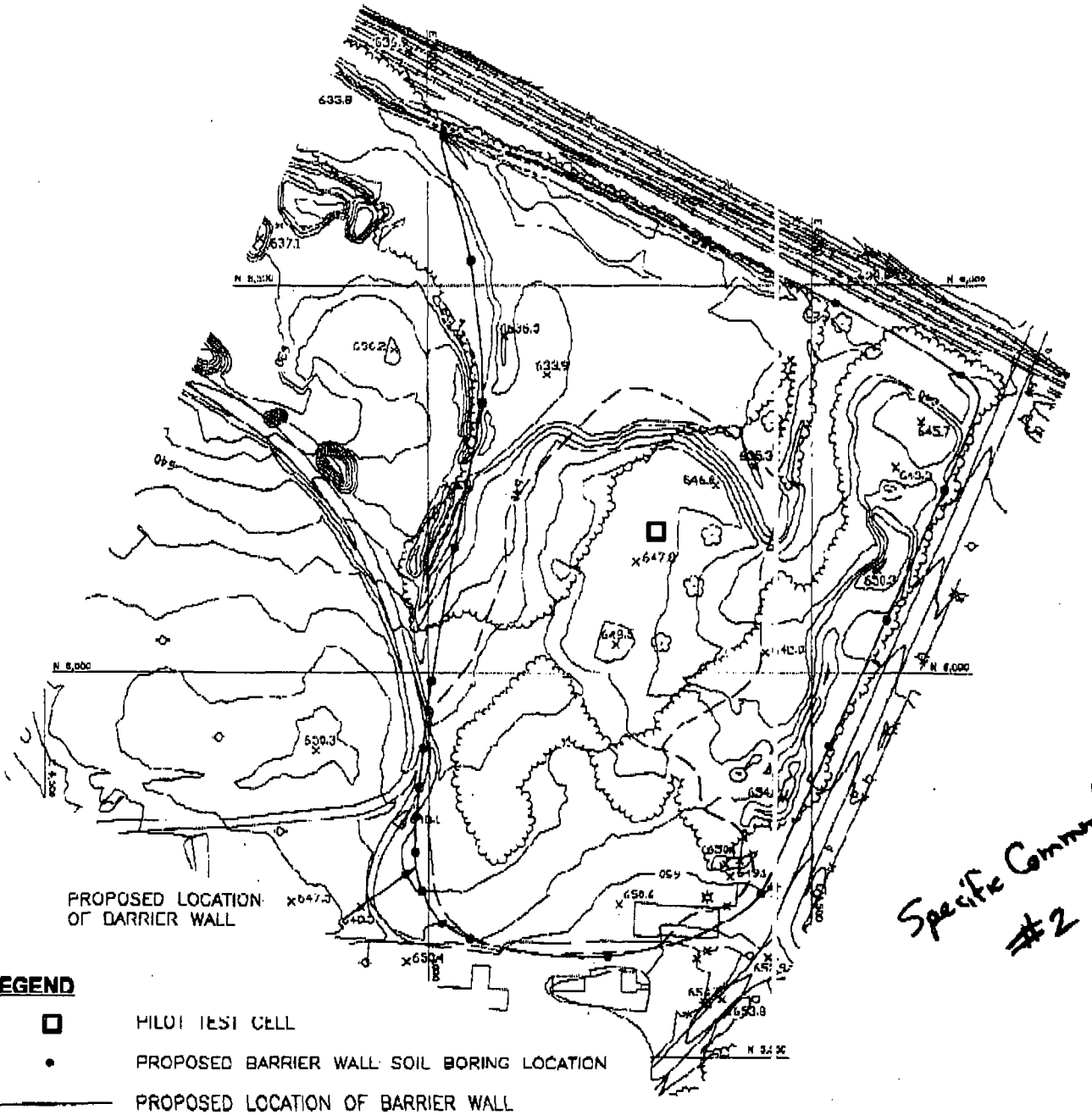
SCALE IN FEET

FIGURE 3

Developed By DMS/DAP	Drawn By TPB	**PROPOSED SOIL BORING LOCATION MAP- STILL BOTTOMS/TREATMENT LAGOON AREA**	Drawing Number 4077.0110 **A3**
Approved By M. HAMPER	Date 5-10-95	BARRIER WALL ALIGNMENT WORK PLAN AMERICAN CHEMICAL SERVICE, INC. NPL SITE GRIFFITH, INDIANA	**MONTGOMERY WATSON**
Reference			
Revisions REVISIONS PER USEPA COMMENTS DAP 7-31-95; TPB 7-31-95; LCL 8-8-95. 8 10 95 & 8 16 95; LCL 12-11-95/JDA			

QUALITY CONTROL | Graphic Standards | Lead Professional | Technical Review | Project Manager | Management Review | Other



Specific Comment #2

LEGEND

- PILOT TEST CELL
- PROPOSED BARRIER WALL SOIL BORING LOCATION
- PROPOSED LOCATION OF BARRIER WALL
- RAILROAD TRACK
- TOPOGRAPHIC CONTOUR
- APPROXIMATE EXTENT OF KNOWN SOIL CONTAMINATION

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL SURVEY MAP OF THE SITE FLOWN ON MARCH 8, 1994 BY GEONEX CHICAGO AERIAL SURVEY, INC.
2. VERTICAL DATUM IS U.S.G.S. DATUM. CONTOUR INTERVAL IS 2 FEET.
3. FINAL BARRIER WALL LOCATION IS DEPENDENT ON RESULTS OF SOIL BORING PROGRAM.

north

0 200 400

SCALE IN FEET

FIGURE 4

Developed By PMS/DAP	Drawn By TPB	**PROPOSED SOIL BORING LOCATION MAP- OFF-SITE CONTAINMENT AREA**	Drawing Number 4077.0110 **A4**
Approved By M. HAMPER	Date 5-10-95	BARRIER WALL ALIGNMENT WORK PLAN AMERICAN CHEMICAL SERVICE, INC. NPL SITE GRIFFITH, INDIANA	**MONTGOMERY WATSON**
Reference			
Revisions REVISIONS PER USEPA COMMENTS DAP 7-31-95; TPB 7-31-95; LCL 8-8-95, 8 10 05 & 8 16 05; LCL 12 11 05/JDA			

C

OHMICRON RAPID ASSAY TEST METHOD

PCB FIELD TEST PROCEDURE ADDENDUM

Ohmicron RaPID Assay Test Method

The Ohmicron RaPID Assay Method will be used for the field analysis of PCBs in soil samples for the Barrier Wall Alignment Investigation at the ACS NPL Site. The analysis is based on the immunoassay method and as such, the test kits yield only screening-level data. The purpose of the field analysis is to screen soil samples in the field to identify samples with PCB concentrations in excess of 10 ppm, and then submit these for laboratory analysis.

General Comment D.

The Ohmicron Field Assay Test Method will be calibrated for a detection limit of 10 parts per million (ppm) PCB for Aroclor 1254, using Method 2, listed on page 4.4 of the User's Guide. Aroclor 1254 was selected because it was the congener that made up nearly 40 percent of the sample detections at the site during remedial investigation sampling and because the Ohmicron system is based on Aroclor 1254.

Ohmicron Specific Comment D.

A supply of sodium sulfate will be maintained in the field laboratory to be used to dry samples as appropriate.

General Comment C

The analytical technician will be trained in the use of the test kit, and training will also be available for the Agency representatives on site during the Barrier Wall Alignment Investigation.

QA/QC for Field Analysis Screening Analysis of PCBs at the ACS NPL Site

Quality Assurance/Quality Control will be conducted at Level QA2, described on Page 3.2 of the User's Guide and detailed on page 3.4 and 3.5. The "*Other QA/QC Considerations*" listed on Page 3.5 will also be given consideration. As stated on Page 5 of the Work Plan, a performance evaluation sample with a known concentration will be analyzed, prior to starting the field work. Field duplicates will be collected to provide assessment of field sampling precision, accuracy, and integrity of the methodology. At least one duplicate analyses will be performed for each set of ten soil samples. Furthermore, soil samples that exceed 10 ppm PCBs based on field screening will be submitted for laboratory analysis to determine if the PCBs are actually present. Laboratory analyses will be performed in accordance with the Contact Laboratory Program, at Data Quality Objective Level 3

Specific Comment B

Field Validation

Field Validation will be conducted throughout the Barrier Wall Investigation sampling, following the Guidance in the *"Immunoassay Methods for SW-846: Recommended Format*

Ohmicron Specific Comment A

and Documentation for New Submittals" (July 1995). As part of the process, standards and proficiency samples will be analyzed with each sample analysis run. For the ACS project in which the detection limit will be set at 10 ppm PCBs, six standards/proficiency samples will be analyzed with each set of analyses. These will include known standards with concentrations of: 2.5 ppm, 5 ppm, 10 ppm, 15 ppm, 40 ppm, and 50 ppm. In addition, all samples that indicate a detection of PCBs at 10 ppm or greater, will be submitted for laboratory analysis. This will result in 100 percent field validation of positive detections for PCBs at greater than 10 ppm.

A copy of the "*RaPID Assay Environmental User's Guide*" follows. The sections that are not applicable to the ACS Site RD/RA have been removed, and those sections have been lined out in the attached Table of Contents.

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TABLE OF CONTENTS

General Comment B

D

FIELD GAS CHROMATOGRAPHY SOP

Section: Field Methods	Section No. 5	Date of Issue 1-3-96	Reviewed By JAH/CCH
SOP Description: Purgeable Volatiles - Barrier Wall	SOP No. 510-mod	Document No. 51_voc.doc	Authorized By GLH/PJV

FIELD GC - PURGEABLE VOLATILES

Scope and Application

This method covers the determination of volatile organic compounds in a variety of non-aqueous matrices in a mobile field laboratory using a gas chromatograph interfaced with a purge & trap. Refer to Table 1 for a breakdown of the ACS Barrier Wall Alignment volatile compounds list and their associated retention times and reporting limits.

Method Summary

In a mobile laboratory setting, samples are analyzed using a purge & trap interfaced to a GC equipped with a capillary column, photoionization detector (PID) and electrolytic conductivity detector (ELCD). This method provides qualitative and estimated quantitative identification of volatile organic compounds.

Method Reference

"Test Methods for Evaluating Solid Waste", SW-846, July 1992, Methods 5030A and 8021.

Reporting Limits

Refer to Table 1 for Barrier Wall Alignment volatile compound reporting limits. Soils will be reported on a wet weight basis. Reporting limits may be affected by high levels of organic compounds, matrix related problems or other interferences.

Optimum Range

Up to 100 times the reporting limit for each matrix group. The optimum range is also affected by specific compounds, the individual program needs, or project reporting limit requirements.

Sample Handling

Non-Aqueous, unpreserved: Soils should be collected in 4 oz glass jars with teflon lined caps. Samples should be packed tightly so that there is no headspace or air pockets in the sample. All samples must be refrigerated at 4°C and analyzed within 14 days of collection.

Reagents and Apparatus (Apparatus can be substituted with equivalents.)

1. Open screw cap 40 mL vial (Pierce #13075 or equivalent).
2. Septum: teflon-faced silicone (Pierce #12722 or equivalent).
3. Purge & trap device: SRI - interfaced to a 8610 GC
4. Trap (primary): Tenax GR (6 x 1/8 in.)
5. Trap (secondary): Carbosieve (6 x 1/8 in.)
6. Purge tubes: 25 mL disposable culture tubes (16x125 mm)
7. Gas chromatograph: SRI 8610 equipped with PID and ELCD detectors in series, megabore capillary column adapters, makeup gas.
8. Column (primary): 15 m x 0.53 mm I.D., Restek MXT-1 metal capillary column, 5 um film depth.
   Alternate column: J&W 30 M DB624 or equivalent
9. Glass Syringes: 5 mL Leurlock tip, 1 mL Hamilton, 100 uL Hamilton, 10 uL Hamilton, and 25 uL Hamilton
10. Balance: ± 0.0001 g (Mettler AE200) (for lab use only)
11. Balance: ± 0.1 g (Ohaus LS200)
12. Reagent water - water which has been shown to be organic-free at the method reporting limits (tap water).
13. Methanol - B&J Brand Purge & Trap Grade
14. Beakers - assorted
15. Volumetric flasks - assorted
16. Pipettes - 5 and 10 mL volumetric
17. Mininert Valves Leurlock
18. Helium - ultra high purity grade
19. Air- zero grade or breathing grade (for DELCD)
20. Standards (refer to reagent preparation section)

Standard Preparation

1. **Stock Standard Solution**: Stock standards should be prepared prior to going into the field. Prepared 5,000 ug/mL stock standard solutions may be purchased from a vendor. Alternatively, prepare a VOC standard containing the target compounds at 5000 ug/mL in methanol.

   - Add about 20 mL of methanol to a 25 mL volumetric flask. Allow the flask to stand unstoppered until the methanol on the neck of the flask has dried. Replace the stopper.

   - Tare the flask on the analytical balance.

   - Remove the stopper and, using a 100 uL syringe, add 0.125 g (correct for % purity) of the reference material to the flask. Make sure the drops fall directly into the methanol without contacting the neck of the flask. Replace the stopper.

   - Determine the mass of reference material added. Rinse the syringe with methanol, tare the flask, and add the next reference standard.

- After the reference materials are added, fill to volume with methanol, cap, and invert to mix.

- Transfer the final stock standard to a screwtop vial for storage.

2. **Secondary Standard Solutions:** Secondary standards should be prepared weekly and stored at 4°C. Prepare secondary solutions in methanol according to the following:

Standard	mLs	Final Volume	Concentration
5000 ug/mL	1 mL	10 mL	500 ug/mL
500 ug/mL	1 mL	10 mL	50 ug/mL
50 ug/mL	2 mL	10 mL	10 ug/mL

(e.g., add 1 mL of the 5000 ug/mL standard to a 10 mL volumetric flask and fill to the line with methanol, and cap. The resulting solution has a concentration of 500 ug/mL.)

3. **Working Calibration Standards:** Prepare calibration standards in DI water according to the following:

Standard	mLs	Final Volume	Concentration
500 ug/mL	20 uL	200 mL	50 ug/L
50 ug/mL	40 uL	200 mL	10 ug/L
50 ug/mL	20 uL	200 mL	5 ug/L

Fill a 200 mL volumetric flask with reagent water to the mark. Directly inject the secondary standard into the water with an appropriate microliter syringe.

Invert the standard 3 times, discard the first 10 mL in the neck of the volumetric flask and transfer aliquots of the standard into a 40 mL VOC vials (no headspace) for storage.

4. **Surrogate Standard:** Surrogate stock standards may be purchased or prepared in advance. The stock standard contains the following two surrogates in methanol:

Specific Comment H.A.

Compound	Concentration
a,a,a-Trifluorotoluene	2000 ug/mL in Methanol
1,4-Dichlorobutane	2000 ug/mL in Methanol

Surrogate Working Standard: For the working surrogate solution, add 50 uL of the TFT stock surrogate solution, and 50 uL of the 1,4-DCBA stock surrogate solution to a 10 mL volumetric flask, and dilute to 10 mL with methanol. This is equal to a 10

ug/mL working surrogate solution. Add 5 uL of the surrogate solution (10 ug/mL) to each standard, sample and blank.

Notes

1. This method is intended for use only by an experienced GC operator in a mobile field laboratory.

2. Apparatus can be substituted with equivalents.

3. Gas chromatographic conditions may be changed to optimize the analysis, provided that performance is determined to be equivalent to that of initial demonstration of capabilities.

Procedure

A. **Gas Chromatographic Conditions:** (Note: SRI rental GCs are configured by SRI for the chosen method prior to shipment. Refer to the SRI manual for specific GC and purge & trap conditions. Conditions vary depending on column choice. The following are provided as an example.)

Column: 30 m x 0.53 mm I.D., DB624 or equivalent

Carrier Gas: Helium
5 mL/min

Detectors (in series):

1. Photo Ionization - 10.0 eV
Sensitivity - Range 10
Temperature - 230°C

2. Electrolytic Conductivity - SRI dry electrolytic conductivity detector
Mode - Halogen
Reactor temperature - 1100°C

Oven:
Initial - 35°C, Hold for 10 min
Ramp - 4°C/min
Final - 200°C

Purge & Trap System:
Trap: tenax/carboseive 3000
Purge Flow: 40 mL/min
Purge Time: 5 minutes
Dry Time: 3 minutes
Desorb Preheat: 245°C

Desorb: 6 minutes at 250°C
Bake: 4 minutes at 260°C
Transfer line: 100°C

B. Calibration

The instrument must be calibrated for all compounds of interest before samples are analyzed. Initial calibration standards must be run at three concentrations, followed by a method blank. The initial calibration must meet the criteria presented in the Quality Control section of this method prior to the analysis of samples. A continuing calibration standard must be run after every ten samples, and at the end of the day. The continuing calibration must meet the criteria presented in the Quality Control section of this method prior to the analysis of samples. If the final continuing calibration is within acceptable QC limits, the next day's run may begin with a continuing calibration standard and a blank.

Specific Comment 4.B.

Follow the chart presented above for working calibration standards to prepare standards. Note that concentrations for specific compounds such as xylenes and ketones may vary.

C. Loading Procedure: (All standards, water samples, and the purge water for direct soil purging are loaded into purge tubes on the purge & trap in a similar manner.)

1. Fill a 5 mL luerlock syringe with sample or standard. To fill the syringe, remove the plunger from the barrel. Uncap the 40 mL VOC vial, and slowly pour the sample into the barrel, taking care to minimize sample volatilization. Fill the barrel to the top, insert the plunger and adjust the volume. Add 5 uL of the surrogate solution (10 ug/mL) to the sample.

2. Load the sample onto the purge & trap.

   If the purge & trap has a sample valve, use the following procedure:
   a) Luerlock the syringe filled with sample to a sample valve on the purge & trap.
   b) Open the sample valve.
   c) Inject the sample into the purge tube with a smooth, steady flow.
   d) Close the sample valve (free end away from line), and remove the syringe.

   If the purge & trap does not have a sampling valve, use the following procedure:
   a) the sample must be transferred directly to the purge tube with a slow, smooth steady flow.
   b) Attach the purge tube to the purge & trap and hand-tighten the nut.

D. Analysis of Low Level Soils:

1. This analysis is performed on soil samples which contain levels of contamination less than 250 ug/kg or when lower reporting limits are required.

2. A calibration curve must be prepared and used for the quantitation of all samples analyzed by this method.

3. Samples are prepared by weighing 1-5 ± 0.1 grams of soil (amount depends on desired reporting limit) into the purge tube. Record the weight, and load the purge tube onto the purge & trap. Add 5 mL of reagent water. Add 5 uL of the surrogate solution (10 ug/mL) to the sample. Note: For samples requiring 5 grams of soil, 10 mL of reagent water is added for better purging.

Second half of Specific Comment H.C.

4. Connect the purge tube to the purge & trap. The GC conditions are the same for or waters.

5. Prepare a method blank by filling the 5 mL syringe with 5 mL reagent water. Add 5 uL of the surrogate solution (10 ug/mL) to the blank. Load onto the purge & trap and analyze. A method blank must be analyzed daily, or for every batch of 20 or fewer samples of a similar matrix, or whenever potential carryover problems are expected.

6. After every batch of 10 or fewer samples of a similar matrix, a calibration check must be analyzed. Prepare the 10 ug/L check standard as outlined in the "Calibration" (Section B) section of this SOP.

E. Analysis of Medium/High Level Soils:

1. This analysis is performed on soil samples which contain levels of contamination above 250 ug/kg or when low reporting limits are not required.

2. The calibration and QC check standards are prepared and analyzed the same as for the water analysis, with the exception that 100 uL of methanol is added to the 5 mL aliquot of standard prior to analysis.

3. Samples are prepared by weighing 5.0 ± 0.05 g of soil in a 20 x 50 mm screw cap centrifuge tube. Record the weight. Add 5 mL of methanol. Cap with a teflon lined screw cap, and invert 20 to 30 times (clay samples may require more inverting). Allow the extract to settle.

4. Add 100 uL of the extract to 4.9 mL of reagent water which results in a 1:50 dilution. Add 5 uL of the surrogate solution (10 ug/mL) to the sample. Load onto the purge & trap and analyze.

5. Follow the chart below if other dilutions are need in order for sample concentrations to fall inside the established calibration range.

Dilution	Weight Sample	mL Methanol	uL Extract Added to 5 mL Reagent Water
50X	5.00g	5.00 mL	100 uL
100X	5.00g	5.00 mL	50 uL
250X	1.00g	5.00 mL	100 uL
500X	1.00g	5.00 mL	50 uL
1000X	1.00g	5.00 mL	25 uL
2500X	1.00g	5.00 mL	10 uL

6. Prepare a method blank by adding 100 uL of methanol to 4.9 mL reagent water to the 5 mL syringe. Add 5 uL of the surrogate solution (10 ug/mL) to the blank. Load onto the purge & trap and analyze. A method blank must be analyzed daily, or for every batch of 20 or fewer samples of a similar matrix, or whenever potential carryover problems are expected.

7. At the end of every run, a 10 ug/L continuing calibration standard must be analyzed, making sure to add 100 uL of methanol to the 5 mL of standard.

Quality Control

1. **Initial Calibration Criteria:**
   a) A minimum of 3 calibration levels must be included in the curve. One of these levels must be at the RDL.
   b) The correlation coefficient (r) for the calibration curve must be >0.995 ($r^2 \geq 0.990$).
   c) The y-intercept expressed as concentration must be < RDL for each analyte.

2. **Calibration Check Standard**: After every 10 or fewer samples of each matrix, a check standard containing all the compounds in the calibration curve must be analyzed (at 10 ppb). All analytes should fall within ±30% of the concentration for the system to be considered in control. If this criteria is not met, determine whether the compound was detected in any of the bracketed samples. If so, run a standard at the RDL (5 ppb). If the 5 ppb standard is ≥50% recovery for that analyte, then no qualification of data is necessary. If the 5 ppb standard is <50% then those compounds must be qualified.

3. **Method Blank:** A method blank must be analyzed at the beginning of every working day before any samples are analyzed and for every batch of 20 or fewer samples of a similar matrix. All compounds of interest must be less than the reporting limit. If any compounds are found in the blank above the reporting limit, corrective action must be taken to alleviate the contamination. Any samples analyzed with the problem blank must have the detected compounds flagged on the final report.

4. **Surrogate Recovery:** Working surrogates are added to each standard, blank, and sample to monitor the performance of the method. Surrogate recoveries are calculated as a percent using the area counts from the sample or blank divided by the area counts from the initial calibration 10 ug/L standard. If a surrogate recovery falls outside of the acceptable control limits of 50 to 150 percent, the sample should be reanalyzed. If the surrogate recovery from the repeat analysis falls outside of the control limits, flag the data as estimated due to matrix interference. If the surrogate recovery for a blank falls outside acceptable limits, the run must be halted and the problem corrected before additional samples may be run.

5. **Sample Results:** Sample results are not considered complete until bracketed by acceptable standards. Results should also be evaluated for blank contamination and surrogate recovery. Results should not be considered final until peer reviewed. Release of preliminary draft results prior to peer review is strongly discouraged. Users of preliminary draft results should be warned the data is not final and is subject to revision.

Calculations

Soil Samples: Prepare a linear regression curve for each compound using a calculator or spreadsheet and the formula:

$$y = xb + a$$

where

y = compound response
x = concentration in ug/L
b = slope
a = y-intercept

Therefore, the sample concentration would be:

$$x = ((y-a)/b) \times \text{dilution factor}$$

Data Reporting

1. All notes, standard conditions, and results will be recorded in a bound notebook.
2. All data generated by field GC will be considered to be tentatively identified, with concentration being estimated.

3. All raw data and the bound notebook will be maintained in the Montgomery Watson project file for final review and archiving.

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Specific Comment H.C.

TABLE 1

Site Target Compound List, Retention Times, & Reporting Limits

Field GC Purgeable Volatiles by Method 8021

For Dewatering/Barrier Wall Alignment Pre-Design Work Plan

American Chemical Services

Griffith, Indiana

Compound List	Retention Times MTX-1 (min)	Retention Times DB-624 (min)	Reporting Limits Low Soils (ug/kg)	Reporting Limits Medium Soils (ug/kg)
ACS Site Target List			5	50
Acetone	9.0	10.6	5	50
1,1 Dichloroethene	10.3	10.0	5	50
trans 1,2 Dichloromethene	11.0	13.7	5	50
1,1 Dichloroethane	11.3	15.6	5	50
2-Butanone (MEK)	11.7	17.8	5	50
cis 1,2 Dichloroethene	12.0	17.6	5	50
1,2 Dichloroethane	13.3	20.3	5	50
1,1,1 Trichloroethane	13.5	19.0	10	100
Benzene	14.1	20.0	5	50
Carbon tetrachloride	13.8	19.3	5	50
Trichloroethene	15.9	21.7	100	1000
4-Methyl-2-pentanone (MIBK)	17.8	24.5	5	50
1,1,2 Trichloroethane	18.3	25.8	5	50
Toluene	18.6	24.8	5	50
Tetrachloroethene	20.0	25.9	100	1000
Chlorobenzene	20.8	27.9	5	50
Ethylbenzene	21.1	28.1	5	50
m+p Xylene	21.3	28.4	5	50
Styrene	21.5	29.3	5	50
o Xylene	21.8	29.2	5	50

Notes:

This table presents the ACS Site Target List to be analyzed using the Field GC Purgeable Volatiles SOP (Method 8021) Note that the Work Plan specifies Method 8010/8020; Method 8021 is a more current VOC method that specifies the use of purge & trap and capillary columns. Both primary and secondary columns retention times are included to allow for flexibility in the field. Retention times will vary depending on GC conditions.

The additional compounds (*italicized*) have been added so that the list includes all compounds detected during the RI at concentrations exceeding 100,000 ug/kg (100 ppm), or 1% of the ROD definition of soils classified as waste (i.e., soils with total VOC concentrations of 10,000 ppm).

Reporting limits are based on standard soil sample preparation methods, and may not be achievable for all samples. High concentrations of target compounds or matrix interferences may require additional dilution of the sample, resulting in higher reporting limits for all target compounds. Samples are to be diluted such that either 1) for target compounds, the sample area count is greater than 50% of the high calibration standard area count, or 2) the highest matrix interference peak area count is less than 50% of the nearest high calibration standard target compound area count

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METHOD 9100

SATURATED HYDRAULIC CONDUCTIVITY

Specific Comment #5

METHOD 9100 ADDENDUM
Saturated Hydraulic Conductivity

The Dewatering/Barrier Wall Alignment Pre-Design Work Plan defines the scope of work for the Pre-Design Investigation to collect site specific data and information to design a barrier wall to isolate the Still Bottom Pond and Off-Site Containment Area at the ACS NPL Site. A copy of Method 9100 follows; it is a 1986 guide to methods for evaluating saturated hydraulic conductivity, saturated leachate conductivity, and intrinsic permeability.

The conceptual design includes a barrier wall, keyed into an underlying clay layer, and constructed, at least in part, with a bentonite slurry mix. The following listing defines sections of Method 9100 that are applicable to the work described in the Dewatering/Barrier Wall Alignment Pre-Design Work Plan.

Section 1. The definitions and formulae provided are applicable

Section 2.1 Sample Collection
- Undisturbed thin-wall samples will be collected of the lower clay layer.
- Bulk samples of the aquifer material will be collected for the mix design.

Section 2.3 Falling head methods
This section provides relevant formulae permeameter testing.

Section 2.6 Falling head test with conventional permeameter
- These tests will be conducted using the U.S. Army Corps method stated in Method 9100.
- Falling heads with conventional permeameter will be performed on undisturbed samples from clay layer and for preliminary trial mixes, until the mix design is nearly established, then samples will be evaluated by tested flexible wall.

Section 2.8 Triaxial-cell method with back pressures. This section will not be used. The method used to conduct Triaxial-Cell testing was not in existence in 1986 when Method 9100 was issued. The method used for Triaxial testing will be ASTM D5084. ASTM D5084 is included in Appendix E.

Section 2.11 Leachate Conductivity using Laboratory Methods. This describes the method that will be used to evaluate the slurry wall mix design with leachate (contaminated water from the upper aquifer at the ACS Site) after the hydraulic conductivity has been tested with plain water.

Section 3 This section will not be used for the ACS RD/RA Pre-Design Work.